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ABSTRACT

Flight phobia is an area which has received little controlled investigation, even though between 10 and 20 percent of flight passengers report a fear of flying in airplanes. A study was conducted to examine the efectiveness of a minimal therapist guided form of stress inoculation training (SIT) for flight phobia. Flight phobic volunteers (N=28) were randomly assigned to either a treatment group or a delayed treatment control group. Treatment subjects were given a manual incorporating SIT procedures and content and were telephoned by the experimenter five times to check on their progress in the manual. Treatment effectiveness was assessed through self-reported fear, participation in a one-hour flight, in-flight measures of pulse rate and subjective anxiety, and participation in flights during a 2 month follow-up. The results revealed that treatment subjects who completed the manual reported less fear and anxiety and participated in the posttreatment flight more frequently than did control subjects. Treatment subjects reported using significantly more coping strategies during the flight and reported their strategies as significantly more effective in reducing their anxiety and fear than did controls. At a 2 month follow-up, treatment subjects significantly increased their flight behavior compared to pretreatment levels and compared to controls. (Author/NB)

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Fear of Flying in Airplanes: Effects of Minimal Therapist Guided Stress Inoculation Training

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Abstract

In this study, the effectiveness of a minimal therapist guided form of stress inoculation training for flight phobia was examined. Twenty eight flight phobic volunteers were randomly assigned to either a treatment group or a delayed treatment control group. Treatment effectiveness was assessed through a) self reported fear, b) participation in a one hour flight, c) in-flight measures of pulse rate and subjective anxiety and d) participation in flights during a two month follow-up. Reported compliance with the treatment manual was high (79%) as compared to 30-50% reported in a recent review. The effectiveness of the treatment is discussed in terms of previous research and current theoretical conceptualizations of fear and anxiety. Future research recommendations are offered.

Fear of Flying in Airplanes: The Effects of Minimal Therapist Guided Stress Inoculation Training

The treatment of phobias was one of the first major areas in which the effectiveness of behavior therapy has been examined. Initial research efforts focused on whether behavior therapy techniques were helpful in the reduction of fear and anxiety. Past research indicated that behavior therapy has been effective in reducing phobias to some degree (Yates, 1975). More recently research efforts have focused on maximizing the effects of treatment and minimizing the costs of treatment.

Flight phobia is an area which has received little controlled investigation, even though 10-20% of flight passengers report a fear of flying in airplanes (Agras, Sylvester, & Oliveau, 1969). Examination of psychological treatments for flight phobia suggests that psychological intervention can reduce fear of flying, but the results have been inconclusive because of methodological difficulties in previous investigations. Major methodological limitations have included lack of control groups, exclusive use of self report measures to measure treatment effects (Bakal, 1981; Denholtz & Mann, 1975; Scrignar, Swanson, & Bloom, 1973; Shaw, 1977; Solyom, Shugar, Bryntwick, & Solyom, 1973; Traub, Grosslight, & Boroto, 1982) use of research participants unrepresentative of flight phobics (Girodo &

Roehl, 1978) and either informal, nonwritten follow-up of treatment effects (Bakal, 1981) or no follow-up of treatment effects (Denholtz & Mann, 1975; Scrignar et al., 1973; Shaw, 1977; Traub et al., 1982).

In the most thorough investigation of psychological treatments for flight phobics to date, Howard, Murphy and Clarke (1983) found that flooding, systematic desensitization, implosion and relaxation were each significantly more effective than a non-treatment control condition in reducing reported flight anxiety after treatment, after a flight and at follow-up as compared to controls. In comparing the relative effectiveness of the treatment groups, those in the systematic desensitization group improved least as compared to the other treatment groups. Although the results of Howard's study are promising, two important measures of treatment effectiveness, whether subjects will actually participate in a posttreatment outcome flight and the number of flights in which a subject will voluntarily participate during follow-up, were not analyzed due to small sample sizes. Analysis of this information could have aided in assessing possible group treatment differences and long term treatment effectiveness.

The present study compared the effectiveness of minimal therapist guided inoculation training (SIT) to a delayed treatment condition for a sample of flight phobics. SIT has been demonstrated to be an effective treatment for individuals

experiencing social phobia (Jerremalm, Jansson, & Ost, 1986) and dental phobia (Klepac, Lander, & Smith, 1984). In addition, the three training components of SIT, namely physiological training (relaxation training), cognitive training (positive self talk and cognitive copings strategies) and exposure (application phase) have been investigated singly and in combination for various phobias and the therapeutic results are positive (Wilson, 1982). Finally, self directed and minimal therapist contact forms of treatment in phobias have generally been associated with positive results (Glasgow & Rosen, 1984; Klepac, Lander, & Smith, 1984).

The following a priori hypotheses were formulated:

1) Treatment subjects who complete treatment will report significantly less anxiety (as measured by the QAF) after treatment, after the flight and at follow-up as compared to control subjects.

2) A significantly greater number of treatment subjects who complete treatment as compared to control subjects will participate in the posttreatment flight.

3) Subjects who complete treatment will obtain significantly lower Subjective Distress Scale (SUDS) and pulse rate (PR) scores as compared to control subjects during the postassessment treatment flight.

4) Treatment subjects who complete treatment will report a significantly higher proportion of flights

taken to opportunities to fly during follow-up as compared to pretreatment levels and as compared to control subjects.

5) Treatment subjects who complete treatment will report utilizing a) more coping strategies than control subjects and b) more effective use of the strategies taught in the stress inoculation training manual.

Method

Subjects

Twenty eight volunteer subjects were recruited through public service radio announcements, three television appearances by the first author and the dissemination of 2,500 flyers announcing a program for fear of flying in airplanes distributed to state agencies, mental health practices and travel agencies. Of the seven males and 21 females who participated in the study, the mean age in years was 40 (range 26-80, *SD* = 11.7) and the mean education in years was 17 (range 14-22, *SD* = 2.2). The mean estimated fear by subjects was 6.5 on a 10 point Likert scale (*SD* = 2.02), with a range of 2-10. There was a wide range of the number of previous flight taken (2-300, *SD* = 70.9), with a median of 12 and a mean of 46 flights taken.

Procedure and Measures

On initial contact volunteers were screened as to whether they had flown at least once before. The study design is presented in Table 1.

Insert Table 1 about here

At pretest, subjects filled out the Questionnaire on Attitudes toward Flying (QAF) and the Flight Behavior Questionnaire (FBQ). The QAF is a 36 item self report questionnaire developed and validated by Howard, Mattick and Clarke (1982) to provide detailed information about the history of the subject's fear of flying, any previous treatment and his or her attitudes to specific aspects of flying. Subjects rate the level of fear they experience in various flight situations, using an 11 point scale. The possible range of scores on the fear scale questionnaire ranges form 0-360. Howard and her associates validated the QAF with a student population (n=501). In a separate clinical sample (n=59), Howard reported test-retest reliability as .92 and split-half reliability as .99. The FBQ is a self report questionnaire designed to provide details of subjects' long term flight behavior before and after treatment. At pretest, baseline pulse rate (PR) and Subjective Distress Scale scores ([SUDS] an estimation of current distress level on a 0-100 scale) were collected in an office setting. A rationale for subject flight participation was presented and an available date for each subject to participate in a flight was identified. Subjects selected for inclusion in the program were asked to pay $35

to cover the cost of air charter and to sign a consent form. Selected subjects were assigned randomly to either the treatment or delayed treatment control group.

Treatment subjects were given a manual incorporating SIT procedures and content (see Footnote 1). The treatment manual consisted of three components:

1) A treatment rationale based on anxiety as consisting of physiological/automatic, emotional/affective, and evaluative/cognitive components.

2) Relaxation training based on the "relaxation response" as proposed by Benson (1975).

3) Presentation of five coping strategies which included distraction, focus on sensations, imagining pleasant events, imagining sensations as something other than anxiety and imagining anxiety in a different situation. Manual instructions also presented "positive self talk" (Meichenbaum, 1977).

In the application phase, the manual instructions directed subjects to imagine a typical flight and use their learned coping skills to deal with difficulties. Subjects were called by the experimenter approximately five times to check on their progress in the manual and answer any questions. Subjects were called the first time approximately three days after receiving the manual. If progress was being made, the subject was called one week

later. If no progress had been made, the subject was called between one and three days later.

Following the completion of the manual or the end of four weeks, treatment subjects were asked to fill out and mail the QAF to the experimenter. One week before the flight, subjects were sent a map and a written reminder to attend the posttreatment assessment flight.

Control subjects did not receive any treatment until after the two month follow-up period. At the pretest session they too filled out the QAF and the FBQ, and PR and SUDS scores were collected. A rationale for the flight was presented to them which indicated that the flight would serve as an important assessment of their flight phobia. At the end of three weeks, subjects were mailed a QAF, asked to fill it out and mail it to the experimenter. One week before the flight, all subjects were sent a map and a written reminder to attend the posttreatment assessment flight.

At the end of the treatment period, both treatment subjects and control subjects were scheduled for a 60 minute flight in a nine person capacity twin engine airplane. The two flight measures (SUDS and PR) were taken on each of five occasions: arrival at the the terminal; seated on the plane before takeoff; five minutes after takeoff; five minutes before landing; and on the ground in the plane after the flight. Following the flight, an unstructured questionnaire was administered to subjects in order to assess utilization

of coping strategies (see Footnote 1).

Eight weeks after the flight, all subjects were contacted by mail and asked to fill out and return the QAF and the FBQ. The experimenter then met with each of the control subjects and provided each with the same treatment a the experimental treatment subjects.

Results

Pretreatment Data

The initial equivalence of the two groups on the QAF scores, SUDS scores and resting PR was tested by one-way analysis of variances (ANOVAs). At pretreatment, the mean estimated fear by all subjects was 6.5 on a 10 point Likert scale with a range of 2-10. A student's t test was conducted to compare the treatment and control group on this self report fear rating. There was no significant effect for groups on any of the measures at baseline, which is consistent with random assignment achieving pretreatment group equivalence.

Manual Compliance and Mean Time Frames for Treatment Completion, Flights and Follow-up

Of the fourteen subjects who began the manual, eleven (78.57%) completed the assignment. Subjects were defined as completing the manual by: a) their own self report at the end of the treatment period, b) telephone call records by the experimenter based on conversations with the subjects and c) written responses in their manuals.

Of those treatment subjects who completed the manual, the mean number of days to complete was 27.54 with a range of 16-39 (SD = 6.56). The mean duration for all subjects from the initial contact until their scheduled flight was 35.4 days with a range of 17-47 (SD = 11.19). The mean follow-up time in days for subjects in the treatment group and the control group was 75.64 (SD = 8.63) with a range of 58-85 days.

Questionnaire on Attitudes Toward Flying Fear Scale Scores

The mean total scores for each group on the QAF at each assessment occasion (pretreatment, posttreatment, postflight and at two month follow-up) are represented in Figure 1 and were analyzed by a one-way ANOVA with repeated measures.

Insert Figure 1 about here

A conservative correction procedure developed by Greenhouse and Geisser (1959) was utilized in order to protect against possible violations of the assumption of independence involved in repeated measures analyses (Harris, 1985).

For the analysis of QAF scores, there was a significant interaction between the groups and trials effects ($F(3,78) = 6.764$, $p < .001$). With a Bonferroni adjustment to the ANOVA to maintain an experimentwise error rate for the ANOVA of .05 (Kirk, 1982), this comparison was

significant at $p < .01$. The Bonferroni adjustment procedure was utilized for follow-up comparisons between the treatment group and control group at each measurement occasion in order to hold the experimentwise error rate at alpha = .05. This resulted in the setting of a .0125 error rate for each comparsion. In univariate follow-up comparisons of all subjects on the QAF, treatment subjects and control subjects failed to differ at baseline, but treatment subjects reported significantly lower QAF scores at posttreatment ($F(1,78) = 28.1428, p < .05$), at postflight ($F(1,78) = 27.5379$, $p < .05$) and at follow-up ($F(1,78) = 35.26, p < .05$).

Posttreatment Assessment Flight Data

For the flight, subjects could have not shown up at the airport or shown up at the airport and participated in the flight. Nine of the 11 treatment subjects who completed the manual and five of the 14 control subjects participated in the flight. Chi square analyses indicated that treatment subjects who completed the manual were significantly more likely to show up at the airport and participate in the flight than were control subjects ($\chi^2(1, N = 28) = 5.314$, $p < .05$).

chi

One-way ANOVAS with repeated measures for the two in-flight measures (SUDS and PR) indicated a failure to detect significant differences between groups across assessment occasion (outside the terminal before the flight; seated on the plane before takeoff; five minutes

after takeoff; five minutes before landing; and on the ground in the plane after the flight).

Follow-up Data

Two by two (2 X 2) chi squares were conducted to compare the two groups (treatment and control) on the following flight behaviors: the number of opportunities to fly, the number of times flying was avoided and actual number of flights taken. The number of opportunities to fly for the two groups failed to be significant during the two months prior to intake or in the two month follow-up. Analyses also indicated that the number of times subjects avoided flights two months prior to intake or in the two month follow-up failed to be significant between the treatment and control groups. However, treatment subjects took significantly more flights during the follow-up period than control subjects (χ^2 (1, N=28) = 12.878, $p < .01$).

In order to examine differences between the proportion of flight opportunities to flights taken for the treatment and control group, a test of significance of two proportions based on the z distribution was utilized. Figure 2 represents the proportion of flight opportunities to actual flights taken for each group two months prior and 2 months following treatment.

Insert Figure 2 about here

A comparison was first made between the pretest treatment and control conditions, which indicated no significant differences between groups (.68 vs. .66) in their proportion of flight opportunities to flights taken. As hypothesized a priori, a one-tailed test comparing pretest to follow-up for the treatment group indicated that treatment subjects significantly increased their flight behavior (.68 vs. .93) during follow-up ($z = -1.673$, $p < .05$). A one-tailed comparison for the control group (pretest to follow-up) indicated no significant change in flight behavior (.66 vs. .5) during the follow-up period. Also as hypothesized, a one-tailed z test indicated that treatment subjects showed significantly more flight behavior than control subjects (.93 vs. .5) during the two month follow-up ($z = 2.545$, $p < .01$).

Coping Measures

Self reported coping strategies were rated by two independent raters who were blind to subject group assignment for the fourteen subjects who participated in the flight. The four categories of coping strategies coded included: 1) no strategy, 2) relaxation alone, 3) cognitive coping strategy or strategies alone or 4) relaxation and cognitive coping strategy combined. Interrater reliability for these ratings by a per cent agreement method was 93%.

Treatment subjects and control subjects differed on the type of strategies they reportedly utilized. Eighty-eight percent of the treatment subjects (eight out of

nine) reported utilizing both relaxation and cognitive coping strategies at some time during the flight whereas no control subject reported utilizing more than one strategy approach (either relaxation or cognitive coping). All control subjects reported utilizing some type of cognitive coping strategy. A comparison based on the z distribution between the treatment and control group indicated that treatment subjects utilized both relaxation and a cognitive coping strategy significantly more often than control subjects during the flight ($z = 3.081$, $p < .01$).

Two independent raters blind to subject group assignment also coded each subject's reported effectiveness of the strategies used by the subject in reducing flight anxiety. The reported strategies were coded as either a) effective or b) somewhat effective or ineffective. Interrater relability on these ratings by a per cent agreement method was 100%. Eight of the nine treatment subjects (88%) viewed their strategies as effective in reducing their fear and anxiety whereas only one control subject (20%) viewed her strategy as effective in reducing fear and anxiety. A test of significance of two proportions based on the z distribution indicated that treatment subjects viewed their strategies significantly more often than control subjects as effective in reducing fear and anxiety during the flight ($z = 2.433$, $p < .05$).

Discussion

The present study examined the effectiveness of a minimal therapist guided stress inoculation treatment for reducing subjects' fear of flying in airplanes. All apriori hypotheses save the predicted in-flight differences obtained support. Treatment subjects who completed the manual reported less fear and anxiety and participated in the posttreatment flight more frequently than control subjects. Treatment subjects also reported utilizing significantly more coping strategies during the flight and reported their strategies as significantly more effective in reducing their fear and anxiety than did control subjects. At a two month follow-up, treatment subjects significantly increased their flight behavior compared to pretreatment levels and as compared to control subjects.

An unexpected finding was that subjects failed to differ in their in-flight anxiety as measured by the PR and the SUDS. Lack of differences for both PR and SUDS could be due to a lack of statistical power. Although the sample size employed here is fairly comparable to that typically used in similar investigations, any replication of this study should improve power by the inclusion of more subjects, approximately 17 per group if PR ratings are to have sufficient statistical power and 45 per group if SUDS ratings are to have sufficient statistical power (Cohen, 1977).

In the only two other studies known to the

authors in which in-flight measures have been taken, results are similar to the current study: no differences in SUDS (Campos, Solyom, & Koelink 1984) or SUDS and PR (Howard et al., 1983) measures between treatment and control groups were detected. Failure to detect differences could also have been due to a lack of statistical power in Howard et al.'s study: if effect sizes for PR and SUDS were similar to effect sizes in the current study, the small number of flight participants in each group (7 to 12 per group) would have been insufficient to detect possible differences.

Because of the methodological liability of lack of power in this experiment, interpretations for the nondectection of differences between groups on the PR and SUDS can only be speculative. However, there are a number of considerations to be taken into account for future researchers in this area. An inherent limitation in collecting in-flight data for flight phobics is there is a self selection of flight participants. Measures can only be taken on those subjects who elect to participate in the scheduled flight, thus possibly eliminating data from the most anxious subjects. As in the current study, it would be expected that fewer control subjects would participate in a flight if treatment is effective. Presumably flight participants will be subjects who feel most able to participate and will potentially be less anxious. Given this inherent measurement limitation of self

selection for flight participation, other measures of treatment success such as willingness to participate in a flight and long term flight behavior may be more valid measures of treatment effectiveness.

Another consideration for future investigators who wish to examine in-flight data for flight phobia is to include PR and SUDS ratings for normal subjects. It has yet to be established that subjects who report no flight phobia have different in-flight SUDS and PR patterns from subjects who report flight phobia.

An unexpected but pleasant result was the relatively high reported compliance rate for the treatment manual subjects of 79%. In two recent review articles, Glasgow and Rosen (1982; 1978) reported that noncompliance rates typically range from 30-50%. Two reported attempts, a self reward contracting supplement (Barrera and Rosen; 1977) and an instruction of Marlatt's Abstinence Violation Effect model (Godding, Klepac, Frenzel, Smith and Fishback; 1986), aimed at increasing compliance with treatment manuals have been investigated, but both methods failed to increase compliance rates. In the current study, minimal therapist contact in the form of telephone calls was present. It could be that simply calling subjects and/or calling subjects according to how much they had progressed increased manual compliance. Another possible important factor in bibliotherapy compliance is subject education level. The mean education in years for

the current sample was 17, and individuals who are more educated may be more likely to complete a bibliotherapy program. Factors of telephone contact and education could be investigated in future studies to explore methods to increase manual compliance.

Although five of the six apriori hypotheses received support, conclusions regarding the treatment procedure must be interpretated cautiously. Treatment subjects received on average five telephone calls of nine minutes from the experimenter, resulting in approximately 45 minutes more contact from the experimenter for treatment subjects than control subjects. It would be helpful in future studies to include a placebo control condition and to utilize multiple therapists in order to control for limitations in the current study design.

The results of the current study generate numerous additional research questions. First, a component analysis of the current treatment procedure could help delineate differential effectiveness of the treatment components such as strategy training and in vivo exposure flights.
In future projects it could also be useful to compare the effectiveness of therapist directed SIT to minimal therapist contact SIT to self directed SIT to identify the most effective forms of SIT. The cost effectiveness of SIT could simultaneously be investigated by, for example, a hierarchal form of treatment of initially treating subjects with self

directed treatment and if unsuccessful, utilizing more costly forms of treatment. Various forms of SIT could also be compared to other behavioral interventions such as graduated exposure or systematic desensitization to examine the most effective form of behavior therapy for flight phobia.

In summary, our study suggests that a SIT manual plus a total of approximately 45 minutes phone contact by a therapist over one month was an effective method of reducing fear of flying in airplanes (as measured by QAF scores, participation in a scheduled flight, self reported coping and flight behavior during a two month follow-up) for most individuals as compared to a no contact control group. Because of the high reported compliance rate with the manual and brief contact time required by a therapist, minimal therapist guided SIT could practically be provided to a large number of flight phobics.

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Footnotes

1. Copies of the Questionnaire on Attitudes toward Flying (QAF), Flight Behavior Questionnaire (FBQ), stress inoculation training manual and unstructured coping questionnaire are available from the first author on request.

Table 1

Study Design

Measures:

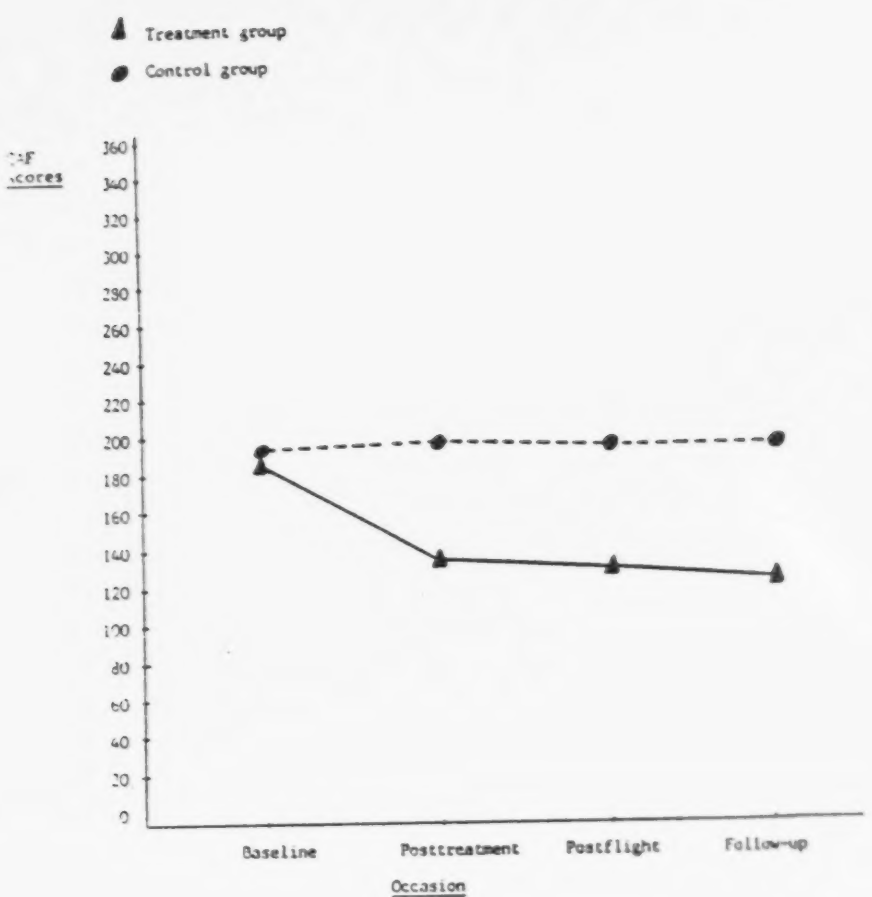
QAF - Questionnaire on attitudes toward flying
SUDS - Subjective distress scale
PR - Pulse rate
Flight participation
FBQ - Flight behavior questionnaire
Coping questionnaire

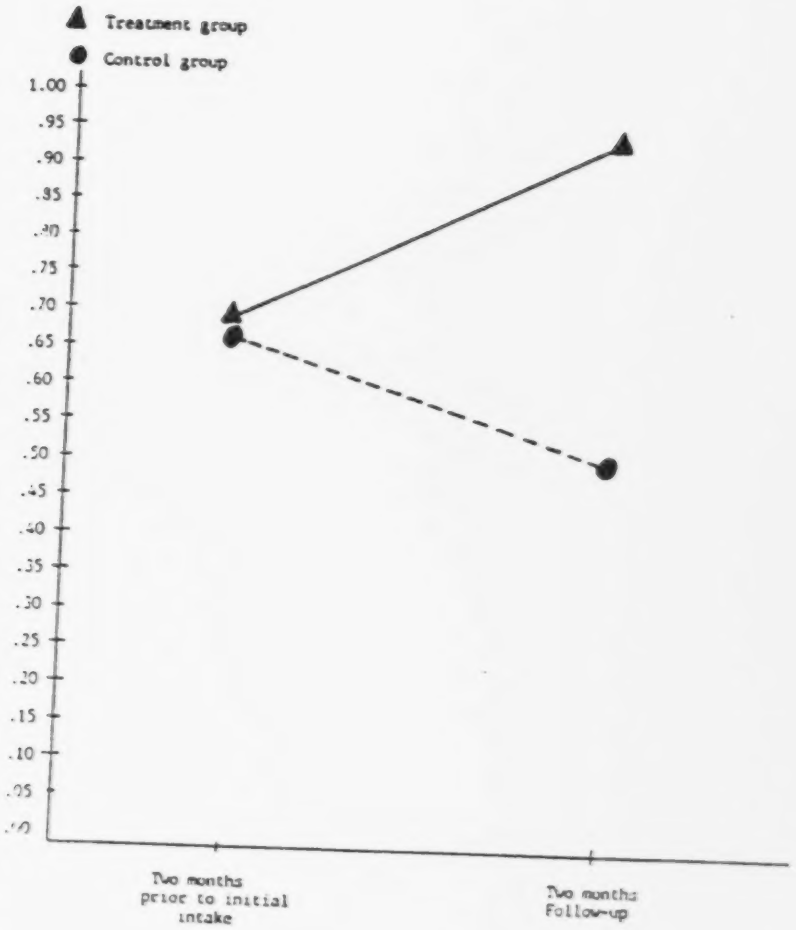
2 MONTHS PRIOR TO TREATMENT	PRETEST	TREATMENT	POSTTEST	POSTTEST ASSESSMENT FLIGHT	POST ASSESSMENT FLIGHT	2 MONTHS FOLLOW-UP	TREATMENT OF CONTROLS
	QAF		QAF		QAF	QAF	
FBQ						FBQ	
					Coping Questionnaire		
				Level of participation			
				SUDS and PR on five occasions			
				O_1 O_2 O_3 O_4 O_5			

Figure Captions

Figure 1. Mean QAF scores for treatment subjects and control subjects across assessment occasions.

Figure 2. Proportion of flight opportunities to actual flights taken by treatment subjects and control subjects two months prior to initial intake and at two months follow-up.


Treatment group
Control group
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
Baseline
Posttreatment
Postflight
Follow-up
Occasion


Treatment group
Control group
1.00
.95
.90
.85
.80
.75
.70
.65
.60
.55
.50
.45
.40
.35
.30
.25
.20
.15
.10
.05
.00
Two months prior to initial intake
Two months Follow-up